TOP

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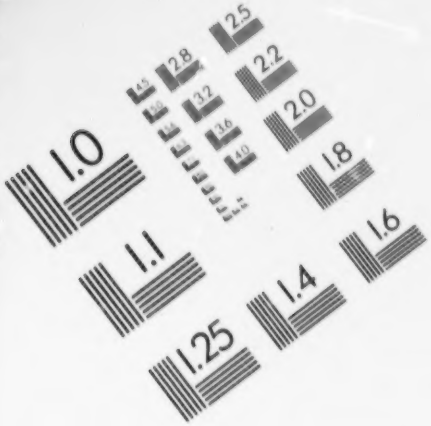

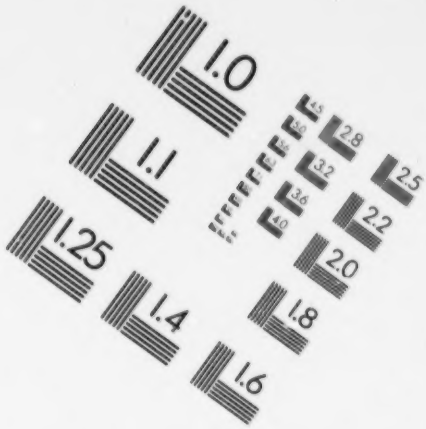

Readex

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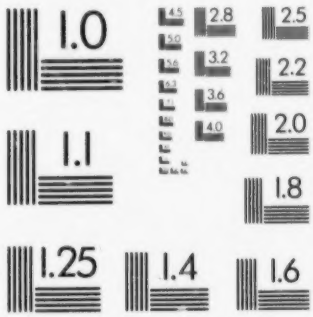
LEFT

PRECISION[SM] RESOLUTION TARGETS



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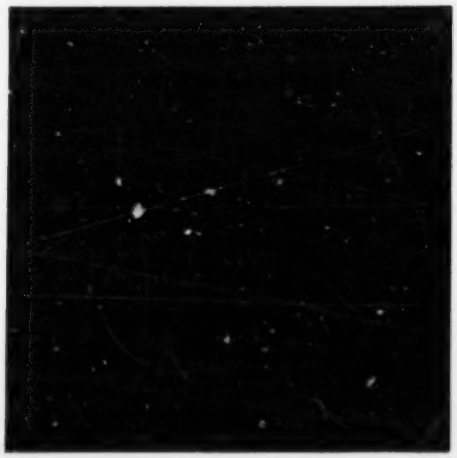

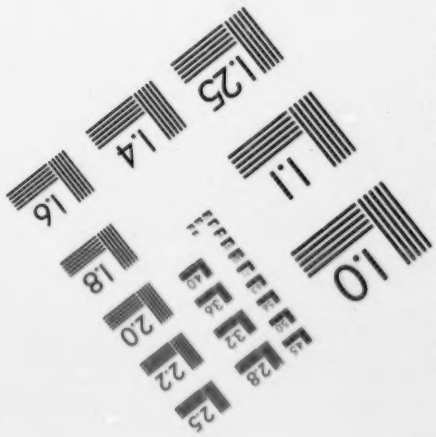

PM-3 8½"x11" PHOTOGRAPHIC GENERAL TARGET
NBS 1010a ANSI/ISO #2 EQUIVALENT

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Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals

Sub-Committee of Experts on the Transport of Dangerous Goods

Forty-fifth session
Geneva, 23 June – 2 July 2014
Item 4 (b) of the provisional agenda
Listing, classification and packing: classification inconsistencies (application of criteria versus dangerous goods list)

Classification of ammonia solutions

Transmitted by the expert from Fertilizers Europe[1]

Introduction

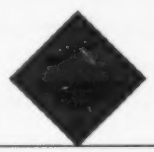
1. There are four UN entries related to ammonia and its aqueous solutions (UN 1005, UN 3318, UN 2073 and UN 2672). There are inconsistencies in the classification of one of the entries, UN 2073.

2. This paper identifies the inconsistencies and makes proposal to remove the same.

Discussion

3. The current entries for anhydrous ammonia and three ammonia solutions are presented in the table below:

[1] In accordance with the programme of work of the Sub-Committee for 2013-2014 approved by the Committee at its sixth session (refer to ST/SG/AC.10/C.3/84, para. 86 and ST/SG/AC.10/40, para. 14).

UN No	Name and Description	Class or Division	Subsidiary Risk
1005	AMMONIA, ANHYDROUS		
3318	AMMONIA SOLUTION, relative density less than 0.880 at 15°C in water, with more than 50% ammonia		
2073	AMMONIA SOLUTION, relative density less than 0.880 at 15°C in water, with more than 35% but not more than 50% ammonia		
2672	AMMONIA SOLUTION, relative density between 0.880 and 0.957 at 15°C in water, with more than 10% but not more than 35% ammonia		

4. Inconsistency between the ammonia solutions classifications

(a) Ammonia Solution (UN 3318, ammonia content >50%) is classified as 2.3 toxic gas, with the subsidiary risk as corrosive;

(b) Ammonia Solution (UN 2672, ammonia content between 10 and 35%) is classified as corrosive;

(c) Ammonia solution UN 2073 (ammonia content between 35 and 50%) is not classified as corrosive or a toxic gas. Its current classification as Division 2.2 Non-flammable, non-toxic gas, appears to be illogical and does not correctly reflect its potential hazards.

5 Of particular relevance is the criterion in which Division 2.2 is assigned if the condition under paragraph 2.2.2.1 (b) (iii) is met. That condition states: "do not come under other divisions." As the ammonia solutions, UN Nos. 3318 and 2672, are classified in the Division 2.3, Toxic gases, UN 2073 should not be placed under Division 2.2, but in Division 2.3 due to its potential to release ammonia vapours, with the subsidiary risk as corrosive.

Proposal

6. It is proposed that the classification of ammonia solution of UN 2073 be changed from Division 2.2 Non-flammable, non-toxic gas, to Division 2.3 Toxic gas, with the subsidiary risk as corrosive. This will be consistent with its properties and classification of other ammonia solutions. The following table summarises the overall situation resulting from the proposed classification.

UN No	Name and Description	Class or Division	Subsidiary Risk
1005	AMMONIA, ANHYDROUS		
3318	AMMONIA SOLUTION, relative density less than 0.880 at 15°C in water, with more than 50% ammonia		
2073	AMMONIA SOLUTION, relative density less than 0.880 at 15°C in water, with more than 35% but not more than 50% ammonia		
2672	AMMONIA SOLUTION, relative density between 0.880 and 0.957 at 15°C in water, with more than 10% but not more than 35% ammonia		

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Sub-Committee of Experts on the Transport of Dangerous Goods

Forty-fifth session
Geneva, 23 June – 2 July 2014
Item 3 of the provisional agenda
Global Harmonization of transport of dangerous goods regulations with the Model Regulations

Packagings for water-reactive materials

Transmitted by the expert from Germany[1]

Introduction

1. During the last session, the Sub-Committee took note of International Maritime Organization's (IMO) decision to strengthen the provisions on packagings for substances which react dangerously with water (see ST/SG/AC.10/C.3/2013/41 together with informal documents INF.3, INF. 4 and INF.5).

2. Some experts expressed their concerns regarding the associated deviations from the Model Regulations. However, the Sub-Committee also confirmed that it was legitimate for IMO to take into account the specific risks associated with sea transport. The Guiding Principles expressly provide for the possibility that stricter packing provisions may be necessary for individual modes of transport.

3. It was agreed that based on a new proposal a decision should be taken regarding the relevance to other modes of transport, and it was suggested that provisions relevant only to sea transport be introduced in the Model Regulations and identified as such.

[1] In accordance with the programme of work of the Sub-Committee for 2013-2014 approved by the Committee at its sixth session (refer to ST/SG/AC.10/C.3/84, para. 86 and ST/SG/AC.10/40, para. 14).

Current differences between the International Maritime Dangerous Goods Code (IMDG Code) and the Model Regulations

4. There are already differences in terms of the assignment of special packing provisions PP31 and PP40.

5. Whereas in the Model Regulations packing provision PP31 only applies to a single entry, namely UN No. 1131 (Class 3 subsidiary risk 6.1), it applies to a multitude of further entries in the IMDG Code (*in Divisions 4.1, 4.2, 4.3 and 6.1 as well as one substance UN 2626 in Division 5.1).* These UN Nos. are as follows: 1183, 1242, 1295, 1310, 1321, 1322, 1326, 1336, 1337, 1339, 1340, 1341, 1343, 1344, 1347, 1348, 1349, 1352, 1354, 1355, 1356, 1357, 1358, 1360, 1362, 1373, 1374 PG II and III, 1378, 1379, 1381, 1382, 1383, 1384, 1385, 1389, 1390, 1391, 1392, 1393, 1394, 1397, 1400, 1401, 1402, 1405 PG II und II, 1407, 1409 PG I, 1410, 1413, 1414, 1415, 1417, 1418 PG I, 1419, 1420, 1421, 1422, 1423, 1426, 1427, 1428, 1432, 1433, 1437,1463, 1517, 1553, 1565, 1571, 1575, 1626, 1680, 1689, 1693 PG I and II, 1694, 1698, 1699, 1701, 1714, 1854, 1855, 1868, 1870, 1871, 1889, 1923, 1929, 1932, 2004, 2008 PG I, II and II, 2009, 2010, 2011, 2012, 2013, 2257, 2318, 2463, 2471, 2478 PG II and III, 2545 PG I, II and III, 2546 PG I, II and III, 2555, 2556, 2557, 2604, 2624, 2626, 2785, 2805, 2806, 2813 PG I, II and III, 2830, 2835, 2844, 2845, 2846, 2852, 2881 PG I, II and III, 2940, 2965, 2988, 3048, 3078, 3088 PG II and III, 3148 PG I, II and III, 3170 PG II and III, 3174, 3181 PG II and III, 3182 PG II and III, 3183 PG II and III, 3184 PG II and III, 3185 PG II and III, 3186 PG II and III, 3187 PG II and III, 3188 PG II and III, 3189 PG II and III, 3190 PG II and III, 3200, 3205 PG II and III, 3206 PG II and III, 3208 PG I, II and III, 3209 PG I, II and III, 3317, 3341 PG II and III, 3342 PG II and III, 3364, 3365, 3366, 3367, 3368, 3369, 3376, 3398 PG I, II and II, 3399 PG I, II and II, 3401, 3402, 3403, 3404, 3413 PG I, II and III, 3414 PG I, II and III, 3448 PG I and II, 3449, 3450 and 3482. The existing stricter provisions of the IMDG Code were converted to the new common format within the framework of the structural reform.

6. PP40 is only assigned to six entries in the Model Regulations (UN Nos. 1326, 1352, 1358, 1437, 1871, 3182). In the IMDG Code, it additionally applies to the following entries: UN Nos. 1340, 1374 PG II, 1378, 1382, 1390, 1393, 1394, 1396 PG II, 1400, 1401, 1402 PG II, 1405 PG III, 1409 PG II, 1417, 1418, 1436 PG II, 2624, 2805, 2813 PG II, 2830, 2835, 3078, 3131 PG II, 3132 PG II and III, 3134 PG II, 3170 PG II and 3208 PG III.

Future amendments to the packing instructions in the IMDG Code

7. For amendment 37 of the IMDG Code, further amendments with regard to the packing provisions are planned. The background of this is a research project entitled "The Safe Sea Transport of Dangerous Goods which react dangerously with Water and/or Carbon Dioxide" (see INF. 3 and INF.4 of 44th session) commissioned by the German Ministry of Transport. The project systematically investigated the sea transport of substances which react dangerously with water. These are those substances that are assigned Emergency Schedule F-G in Table 3.2 of the IMDG Code; these are entries assigned to Divisions 4.1, 4.2, 4.3 and 5.1.

8. In line with the recommendations of the research project, Germany proposed to IMO measures regarding the fire protection equipment, the adaptation of the Emergency Response Procedures for Ships Carrying Dangerous Goods (the EmS Guide), additions to the training for fire fighting and the adaptation of the provisions on stowage, segregation, loading and packaging in the IMDG Code (see INF.5, 44th session). The proposed

amendments were adopted at the 17th session of the IMO Sub-Committee on Carriage of Cargoes and Containers (CCC) (formely DSC) and – to the extent that they concern the IMDG Code – included draft amendment 36. Only the amendments regarding the packing provisions were postponed to a later date following the discussion in the IMO Editorial and Technical Group to permit a discussion in the TDG Sub-Committee beforehand.

9. Within the framework of the study, the influence of water as one of the significant risks (deductive and inductive) was identified.

10. Moisture in a container may contribute to causing a fire in connection with dangerous goods (deductive risk). Depending on the packaging properties, condensation water may soak the packaging so that the dangerous good comes into contact with water and triggers a dangerous reaction. In particular dangerous goods of Division 5.1 (e.g. potassium persulfate) may react with sodden organic packaging material (paper, cardboard) and ignite. Moreover, air humidity may also be relevant: Some goods in liquid form are transported in tanks or drums with pressure-relief devices. Small amounts of dangerous flammable gases may escape through these devices. If the humidity in the container is high and the concentration of dangerous gases in the air reaches a critical level, a reaction may occur and the mixture of gas and air may ignite spontaneously. Another possible risk is the formation of corrosive substances which corrode the structure of the container and the ship. Water may also enter into the container during transport, e.g. through the ventilation system, particularly in heavy seas, as well as in the case of leaks and collisions.

11. Water-related risks are particularly relevant in sea transport: in addition to the ingress of sea water, air humidity and condensation result in difficulties more frequently than in other modes of transport due to the in some cases long voyage durations and the different climatic zones. Usually, sea water is the only available extinguishing agent, which is used both for fires in containers with substances reacting dangerously with water and for the other adjacent containers. Moreover, it has to be taken into consideration that, unlike in air transport, it is permitted to use packagings with venting devices. Accordingly, stricter packing provisions already apply to many of the examined substances in the IMDG Code.

12. Thus, the risks are different in sea transport than in other modes of transport. Therefore, it would not be justified to introduce these stricter packing provisions multimodally. However, the additional requirements for sea transport do not preclude carriage with other modes of transport; thus, packagings in accordance with the IMDG Code also permit multimodal transport.

Solution

13. To reflect the multimodal character of the Model Regulations, the additional requirements that apply to sea transport should also be contained in the Model Regulations. For this purpose, packing provisions formulated specifically for sea transport should be assigned to entries that are assigned packing provision PP31 or PP41 only in the IMDG Code: "PP xx For sea transport of UN Nos. ... packagings shall be hermetically sealed." and "PP yy For sea transport of UN Nos. ... bags are not allowed." For the packing provisions for large packagings and IBCs provided in ST/SG/AC.10/C.3/2013/41, too, special packing provisions formulated specifically for sea transport should be added to the Model Regulations.

14. In addition, the text of the Guiding Principles should be supplemented to illustrate which amendments have been made.

Proposals

Proposal 1: Amendment of packaging provisions

Packagings

Table 3.2, Column 9:

Insert a new PPxx "For sea transport of UN Nos. ... packagings shall be hermetically sealed." against the following entries:

1183, 1242, 1295, 1310, 1321, 1322, 1326, 1336, 1337, 1339, 1340, 1341, 1343, 1344, 1347, 1348, 1349, 1352, 1354, 1355, 1356, 1357, 1358, 1360, 1362, 1373, 1374 PG II and III, 1396 PG II,1378, 1379, 1381, 1382, 1383, 1384, 1385, 1389, 1390, 1391, 1392, 1393, 1394, 1395, 1396 PG III, 1397, 1398, 1400, 1401, 1402 PG I and II, 1403, 1405 PG II and II, 1407, 1409 PG I and II, 1410, 1413, 1414, 1415, 1417, 1418 PG I, II and III, 1419, 1420, 1421, 1422, 1423, 1426, 1427, 1428, 1432,1433, 1436 PG I, II and III, 1437, 1463, 1517, 1553, 1565, 1571, 1575, 1626, 1680, 1689, 1693 PG I and II, 1694, 1698, 1699, 1701, 1714, 1854, 1855, 1868, 1870, 1871, 1889, 1923, 1929, 1932, 2004, 2008 PG I, II and II, 2009, 2010, 2011, 2012, 2013, 2257, 2318, 2463, 2471, 2478 PG II and III, 2545 PG I, II and III, 2546 PG I, II and III, 2555, 2556, 2557, 2604, 2624, 2626, 2785, 2805, 2806, 2813 PG I, II and III, 2830, 2835, 2844, 2845, 2846, 2852, 2881 PG I, II and III, 2940, 2965, 2988, 3048, 3078, 3088 PG II and III, 3131 PG II and III, 3132 PG II and III, 3134 PG II and III, 3135 PG II and III, 3148 PG I, II and III, 3170 PG II and III, 3174, 3181 PG II and III, 3182 PG II and III, 3183 PG II and III, 3184 PG II and III, 3185 PG II and III, 3186 PG II and III, 3187 PG II and III, 3188 PG II and III, 3189 PG II and III, 3190 PG II and III, 3200, 3205 PG II and III, 3206 PG II and III, 3208 PG I, II and III, 3209 PG I, II and III, 3317, 3341 PG II and III, 3342 PG II and III, 3364, 3365, 3366, 3367, 3368, 3369, 3376, 3395 PG II and III, 3396 PG II and III, 3397 PG II and III, 3398 PG I, II and II, 3399 PG I, II and II, 3401, 3402, 3403, 3404, 3413 PG I, II and III, 3414 PG I, II and III, 3448 PG I and II, 3449, 3450 and 3482.

Insert a new PPyy "For sea transport of UN Nos... bags are not allowed." against the following entries:

1340, 1374 PG II, 1378, 1382, 1390, 1393, 1394, 1395, 1396 PG II and III, 1396 PG II and III, 1398, 1400, 1401, 1402 PG II, 1403, 1405 PG II and PGIII, 1409 PG II, 1417, 1418, 1436 PG II, 2624, 2805, 2813 PG II, 2830, 2835, 3078, 3131 PG II, 3132 PG II and III, 3134 PG II, 3170 PG II and 3208 PG II and PG III.

insert a new PP zz "For sea transport of UN Nos.... flexible, fibreboard or wooden packagings shall be sift-proof and water–resistant or shall be fitted with a sift-proof and water-resistant liner" against the following entries:

1309, 1323, 1333, 1376, 1408, 1435, 1449, 1457, 1472, 1476, 1483, 1509, 1516, 1567, 1869, 2210, 2793, 2858, 2878, 2950, 2968, 3089, 3096 and 3125

Consequential amendments:

P001: Insert:

"PP xx For sea transport of UN Nos. 1553, 1693, 1694, 1699, 1701, 2478, 2604, 2785, 3148, 3183, 3184, 3185, 3186, 3187, 3188, 3398 (PG II and III), 3399 (PG II and III), 3413 and 3414, packagings shall be hermetically sealed."

P002: Insert:

"PPxx For sea transport of UN Nos. 1362, 1463, 1565, 1575, 1626, 1680, 1689, 1698, 1868, 1889, 1932, 2471, 2545, 2546, 2881, 3048, 3088, 3170, 3174, 3181, 3182, 3189, 3190, 3205, 3206, 3341, 3342, 3448, 3449 and 3450, packagings shall be hermetically sealed.

PPzz For sea transport of UN Nos. 1309, 1323, 1333, 1376, 1435, 1449, 1457, 1472, 1476, 1483, 1509, 1516, 1567, 1869, 2210, 2858, 2878, 2950, 2968, 3089, 3096, 3125 flexible, fibreboard or wooden packagings shall be sift-proof and water resistant or shall be fitted with a sift-proof and water resistant liner."

PP003: Insert:

"PPzz For sea transport of UN Nos. 1408 and 2793 flexible, fibreboard or wooden packagings shall be sift-proof and water resistant or shall be fitted with a sift-proof and water resistant liner."

P401: Insert:

"PPxx: For sea transport of UN Nos. 1183, 1242, 1295, 2965 and 2988, packagings shall be hermetically sealed."

P402: Insert:

"PPxx For sea transport of UN Nos. 1389, 1391, 1392, 1420, 1421, 1422, 3148, 3184 (PG II), 3185 (PG II), 3187 (PG II), 3188 (PG II), 3398 (PG I), 3399 (PG I) and 3482, packagings shall be hermetically sealed."

P403: Insert:

"PPxx For sea transport of UN Nos. 1360, 1397, 1402 (PG I), 1404, 1407, 1409, 1410, 1413, 1414, 1415, 1418 (PG I), 1419, 1423, 1426, 1427, 1428, 1432, 1433, 1714, 1870, 2010, 2011, 2012, 2013, 2257, 2463, 2806, 2813 (PG I), 3208, 3209, 3401, 3402, 3403 and 3404, packagings shall be hermetically sealed, except for solid fused material."

P404: Insert:

"PPxx For sea transport of UN Nos. 1383, 1854, 1855, 2008, 2441, 2545, 2546, 2846, 2881 and 3200, packagings shall be hermetically sealed."

P405: Insert:

"PPxx For sea transport of UN 1381, packagings shall be hermetically sealed."

P406

"PPxx For sea transport of UN Nos. 1310, 1320, 1321, 1322, 1336, 1337, 1344, 1347, 1348, 1349, 1354, 1355, 1356, 1357, 1517, 1571, 2555, 2556, 2557, 2852, 3317, 3364, 3365, 3366, 3367, 3368, 3369, 3370 and 3376, packagings shall be hermetically sealed."

P410: Insert:

"PPxx For sea transport of UN Nos. 1326, 1339, 1340, 1341, 1343, 1352, 1358, 1373, 1374, 1378, 1379, 1382, 1384, 1385, 1390, 1393, 1394, 1400, 1401, 1405, 1417, 1431, 1437, 1871, 1923, 1929, 2004, 2008, 2318, 2545, 2546, 2624, 2805, 2813, 2830, 2835, 2844, 2881, 2940, 3078, 3088, 3170 (PG II), 3182, 3189, 3190, 3205, 3206, 3208 and 3209, packagings shall be hermetically sealed.

PPyy For sea transport of UN Nos. 1340, 1374 PG II, 1378, 1382, 1390, 1393, 1394, 1395, 1396 PG II and III, 1396 PG II and III, 1398, 1400, 1401, 1402 PG II, 1403, 1405 PGIII, 1409 PG II, 1417, 1418, 1436 PG II, 2624, 2805, 2813 PG II, 2830, 2835, 3078, 3131 PG II, 3132 PG II and III, 3134 PG II, 3170 PG II and 3208 PG III bags are not allowed."

P503: Insert:

"PPxx For sea transport of UN 2626, packagings shall be hermetically sealed."

IBCs

Table 3.2, Column 9

Insert a new special packing provision "Bx" to the following entries:

1309, 1376, 1390, 1393, 1394, 1396, 1400, 1401, 1402, 1405, 1417, 1483, 1869, 1932, 2008, 2545, 2546, 2624, 2793, 2813, 2830, 2878, 2881, 3078, 3170, 3189 and 3208.

IBC 08:

Insert a new special packing provision Bx as follows:

"Bx For transport by sea of UN Nos. 1309, 1376, 1390, 1393, 1394, 1396, 1400, 1401, 1402, 1405, 1417, 1483, 1869, 1932, 2008, 2545, 2546, 2624, 2793, 2813, 2830, 2878, 2881, 3078, 3170, 3189 and 3208 flexible, fibreboard or wooden IBCs shall be sift-proof and water resistant or shall be fitted with a sift-proof and water resistant liner."

Large packagings

Table 3.2, Column 9

Add a new special large-packing provision "Lx" to PGIII entries of UN Nos. 1309, 1376, 1483, 1869, 2793 and 2878.

Add a new special large-packing provision Ly to PG III entries of UN Nos. 1932, 2008, 2009, 2545, 2546, 2881 and 3189.

LP02

Insert the new special packing provisions as follows:

"Lx For sea transport of UN Nos. 1309, 1376, 1483, 1869, 2793, 2858 and 2878, flexible or fibre inner packagings shall be sift-proof and water-resistant or shall be fitted with a sift-proof and water-resistant liner.

Ly For sea transport of UN Nos. 1932, 2008, 2009, 2545, 2546, 2881 and 3189 flexible or fibre inner packagings shall be hermetically sealed."

Proposal 2: Amendment of the Guiding Principles [English only]

Amend 4.1 of the guiding principles as follows: (New text is underlined)

General provisions:

1. Packing instructions should be clear and provide as wide a choice of packagings as possible.

2. The packing instructions consist of a small number of general instructions supplemented by a limited number of more specific instructions for particularly hazardous or specialized dangerous goods.

3. Packing instructions should be developed with the objective of being suitable for multimodal transport. More severe packaging restrictions, in some instances, may be necessary for mode specific regulations. For maritime transport particularly the presence of the aquatic environment, air moisture and the problems of condensation involved in the changes in vessels in geographic areas with very different climates may require for some substances stricter provisions with regard to the water resistance and the tightness of packagings.

4. A rationalized approach (based on similar properties or hazards presented) should be used for allocating packing instructions to specific substances.

5. The packing instructions are primarily intended for the person preparing the package for consignment. They should not address classification or operational provisions

The packing instruction structure

There are packing instructions for:

- Packagings, prefixed by "P". Included are:

  – Packagings in accordance with Chapter 6.1 (up to 450 l and/or 400 kg net, as appropriate).

  – Pressure receptacles in accordance with Chapter 6.2.

  – Packagings for Division 6.2 substances in accordance with Chapter 6.3.

  – Packagings or packing methods not subject to the provisions of Chapters 6.1, 6.2, 6.3, 6.5 or 6.6.

  – IBCs, prefixed by "IBC", up to 3 m3 (intermediate bulk containers in accordance with Chapter 6.5);

  – Large packagings, prefixed by "LP", exceeding 400 kg net or 450 l (large packagings in accordance with Chapter 6.6).

The majority of substances and articles, excluding Classes 1, 2 and 7, have been allocated to a packing instruction beginning "P00*". When considering new packing instructions the use of one of these numbers should be considered first; class specific packing instructions should only be used when there is need for restricted packaging options or extensive special conditions. The exception to this rule is P004 to which fuel cell cartridges containing dangerous goods of different Classes are assigned.

Where the "P00*" instructions cannot be used then there are series of class specific packing instructions all beginning with the class number. In some cases it will be necessary to indicate in the Packing Instruction that in addition to the permitted design types packages and any quantity thresholds that are specified, there are some "Additional Requirements" that apply for all substances or articles assigned to that packing instruction. An example is the requirement to protect cells and batteries against short circuit as may be found in Packing Instruction P801 or P903. Some packing instructions may need to include provisions which are relevant only for a small number of substances or articles among many others that are assigned to a particular Packing Instruction. These are referred to as special packing provisions and because these are indicated in Column 9 of the Dangerous Goods List they are individually numbered as PPxx. An example is PP28 which is specific to Perchloric Acid in Packing Instruction P502. Some, such as PP26 which requires packagings to be lead free, will appear in more then one Packing Instruction with the same

number since the requirement is the same but the UN numbers to which it applies are different. Usually, the packaging provisions apply in all modes, an example is PP 31 which requires hermetically sealed packagings. However, some, such as PPxx which requires hermetically sealed packagings for transport by sea, is specifically designated to one mode.

Where a solid or liquid substance can only be transported in a cylinder then allocation to Table 3 of P200 shall be considered.

[...]

United Nations ST/SG/AC.10/C.3/2014/42

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Sub-Committee of Experts on the Transport of Dangerous Goods

Forty-fifth session
Geneva, 23 June – 2 July 2014
Item 2 (b) of the provisional agenda
Explosives and related matters: review of test series 6

Proposal for an alternative for the test 6 (c) for the testing of CARTRIDGES, SMALL ARMS (UN No. 0012)

Transmitted by the expert from Germany[1]

Introduction

1. In accordance with paragraph 16.6.1.1 of Section 16 of the Manual of Tests and Criteria (ST/SG/AC.10/11/Rev.5), the Test 6 (c) is performed on packages of an explosive substance or explosive articles, or unpackaged explosive articles, to determine whether there is a mass explosion or a hazard from dangerous projections, radiant heat and/or violent burning or any other dangerous effect when involved in an external fire.

2. In the case of CARTRIDGES, SMALL ARMS (UN No. 0012), the general effects when involved in a fire are sufficiently well known. The general design of the ammunition has not changed in the last century. Thus, there are numerous test reports: the real hazard is not a mass explosion or radiant heat but projections. In the bonfire test used up to now, the hazard is assessed on the basis of the depth of the perforation of the witness screens or the throw distance and mass of the projections.

3. Within the framework of the Test 6 (c), at least 0.15 m^3 of packages have to be stacked. In the case of ammunition of calibre .22, this amounts to more than 100,000 articles. In the case of calibre 9mm Luger, it amounts to 37,500 rounds. Even in the case of

[1] In accordance with the programme of work of the Sub-Committee for 2013-2014 approved by the Committee at its sixth session (refer to ST/SG/AC.10/C.3/84, para. 86 and ST/SG/AC.10/40, para. 14).

the relatively large cartridges of calibre 308 WIN, 6,000 pieces have to be tested. Only a small percentage of these hits the witness screens during the test. The search for the projections cast farthest away is difficult due to their small size. After the test, the majority of the articles is scattered across the test range; some of them are damaged but have not exploded and therefore pose a latent hazard during clear-up activities. For reasons of environmental protection and occupational health and safety but also with a view to the informative value of the test itself (problem of the correlation between perforation depth and energy), an alternative test method 6 (c) (i) for ammunition is proposed.

Proposal

4. Insert a new test type in section 16.1.1:

"Type 6 (e): a test for determining the maximum energy of projectiles from CARTRIDGES, SMALL ARMS (UN 0012) that may be generated in the case of an inadvertent actuation, e.g. in a fire.

5. In section 16.2.2, insert the following before the last paragraph:

Test type 6(e) is only applied for articles of UN 0012 CARTRIDGES, SMALL ARMS and, replaces test type 6(c) in the series if it is to be determined whether, based on the criterion for the energy of projections, classification 1.4S is correct.

6. Add a new section 16.8:

"16.8 Series 6 type (e) test prescription

16.8.1 Test 6 (e): Determination of the energy of projectiles from cartridges

16.8.1.1 *Introduction*

This test with a single cartridge with a projectile serves to determine the maximum possible energy of a projectile that may be generated in an actuation if no packaging reduces the energy and the cartridge is supported by a fixed anvil block.

16.8.1.2 *Apparatus and materials*

The following items are required:

(a) An appropriate actuator;

(b) A ballistic pendulum with an interception device for the projectile for determining the energy; or

(c) A high-speed camera and a background with a scale to determine the velocity of the projectile.

16.8.1.3 *Procedure*

The test is performed on single cartridges. The cartridge is actuated by means of the primer cap and a firing pin, as in the weapon. The cartridge, actuator and measuring device are arranged along the flight path in such a way that angle errors are minimized.

The test is performed three times.

16.8.1.4 *Test criteria and method of assessing the results*

The energy of the projectile is calculated either from the maximum displacement of the ballistic pendulum or from the velocity determined by the high-speed camera taking the mass of the projectile into account.

If the energy of the projectile is not greater than 8 J in any of the test runs, the article, in the appropriate packaging in accordance with section 3.2, may be assigned to Division 1.4 Compatibility Group S.

Reasoning

7. The test method proposed here simulates the worst case of projection effects due to exposure to fire for cartridges for small arms:

(a) What is measured is the energy of the projectile, as the projectile is the projection with the highest mass, the highest energy density and thus the most dangerous.

(b) Neither packaging components nor other cartridges reduce the velocity of the projectile.

(c) The energy is measured when the velocity is at its maximum and not at a distance of 4 m.

(d) The cartridge case has a fixed anvil block and can thus provide a stronger impulse than an cartridge openly exposed to fire.

(e) The primer cap of the cartridge is actuated in accordance with the provisions and can thus ignite the propelling charge in an optimal way.

(f) During the test, the primer cap of the cartridge remains in the base of the cartridge case as it is supported by the actuator. In this way, a higher pressure can build up in the cartridge and the projectile receives more energy.

(g) The smokeless powder has not been subjected to thermal stress and is thus still fully effective.

(h) The cartridge is actuated at ambient temperature and not in hot fire where the strength of the brass and thus the maximum possible internal pressure of the cartridge would be reduced prior to the burst.

8. Numerous tests have shown that the dispersion in the velocities of projectiles of the same ammunition is relatively low (less than ±5 %). This is the reason why the informative value of this test method is especially high. The test setup and representative findings are presented in the Annex.

Justification

9. The proposed test method can, with considerably less test effort, yield reproducible findings on the maximum energy of projections from projectiles for small arms if these are exploded by means of an external fire. The test can also be performed in buildings. Therefore, there no longer is a dependency on weather conditions.

10. Compared with the conventional bonfire test, also the environmental impact (CO^2 emissions, harmful flue gases, large quantities of waste) is considerably lower and occupational safety is improved. The total costs of the test are reduced.

Annex

1. Tests performed by the Federal Institute for Materials Research and Training (BAM) to determine the kinetic energy of cartridges for small arms UN 0012 by means of a high-speed camera

Within the framework of the tests, individual cartridges were actuated with the BAM actuator (see INF.27 43rd session) and recorded in front of a scale with a high-speed camera with either 10,000 fps or 5,000 fps. By evaluating the single frames, the velocity can be easily determined.

Fig. 1: Projectile after firing without barrel at t = 0

Fig. 2: Projectile at the end of the scale at t = 3.2 ms

Table 1 shows the energies of the projectiles of various cartridges determined by BAM

Table 1: Energy of various cartridges after actuation without barrel

Calibre	*Mass of projectile [g]*	*Velocity [m/s]*	*Energy [J]*
.308 WIN	11.61	32.0	5.94
.308 WIN	11.61	31.5	5.76
.308 WIN	11.63	31.4	5.73
.308 WIN FC	11.664	28.9	4,87
.223 REM	3.569	24.4	1.06
.44 MAG	15.63	29.6	6.85
.22 LR	2.399	39.1	1.83
9x19mm	8.045	37.0	5.51

2. Tests performed by BAM to determine the kinetic energy of cartridges for small arms UN 0012 by means of a ballistic pendulum

The test setup can be seen from Figure 3: the ballistic pendulum was installed by bifilar suspension (using two 1,000 mm long fishing lines) at the end of the visual measuring section. The projectile was intercepted by mineral modelling clay in the pendulum. The pendulum gauge was read by means of a video recording (Figure 4).

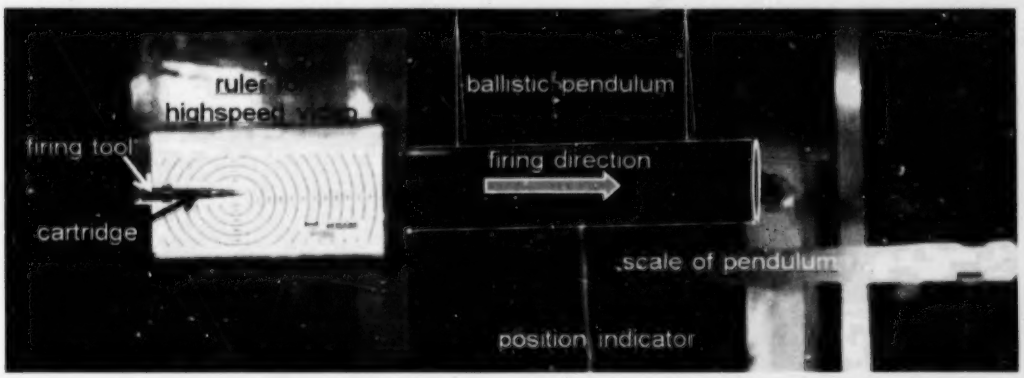

Fig. 3: Test setup ballistic pendulum

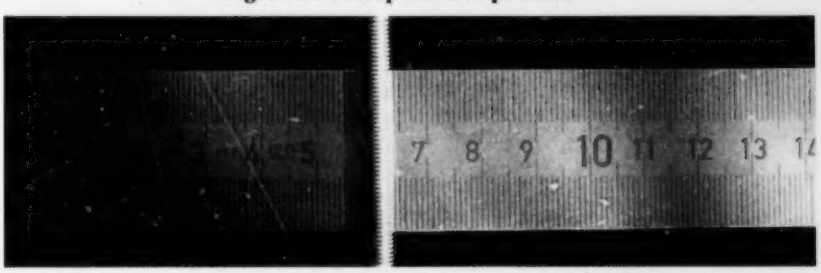

Fig. 4: Highest reading on pendulum gauge

The evaluation of the test results showed that the pendulum is capable of producing the same results as the evaluation of high-speed video recordings but with less evaluation effort. In the specific case, a projectile velocity of 32.6 ±0.5 m/s was determined by means of the pendulum. The evaluation of the high-speed video yielded a value of 33.0±0.6 m/s.

BAM is currently building the prototype of an improved pendulum that will be easy to use and ensures a high degree of occupational safety.

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Item 4 (c) of the provisional agenda
Listing, classification and packing: miscellaneous

PP83

Transmitted by the expert from the United Kingdom[1]

Introduction

1. PP83 was first included the thirteenth edition of the Model Regulations and was primarily intended to allow the carriage of UN 2813 (water reactive solid, n.o.s.) in small quantities in inner packagings without the threaded closures previously required under P403. The main usage was foreseen as a heating mechanism for ready meals for military personnel, campers and hikers.

2. The original United Kingdom proposal on which PP83 is based (ST/SG/AC.10/C.3/2001/17) related only to UN 2813 in packing group I. In packing groups II and III, UN 2813 is transported in accordance with P410 which has never included a requirement for threaded closures.

3. However, in the United Kingdom's paper (ST/SG/AC.10/C.3/2002/11) to the twenty-first session, an amendment to P403 itself was proposed, and the Sub-Committee decided to replace the requirement for threaded seals with hermetic sealing "e.g. by taping or threaded closures". Furthermore, PP83 was extended to packing groups II and II under P410 on the proposal of the United States (ST/SG/AC.10/C.3/2002/54). These changes were also made in the13th edition.

[1] In accordance with the programme of work of the Sub-Committee for 2013-2014 approved by the Committee at its sixth session (refer to ST/SG/AC.10/C.3/84, para. 86 and ST/SG/AC.10/40, para. 14).

4. PP83 is not compulsory for the transport of UN 2813 in combination packages either in P403 or P410. In both packing instructions the use of plastics inner packaging is permitted in quantities far exceeding the PP83 limits.

5. Since the original stated reason for adding PP83 no longer exists and the text does not provide anything that is not covered by the rest of the packing instruction, it appears that PP83 is redundant in both packing instructions and could be deleted.

Proposal

6. In column (9) of the Dangerous Goods List in Chapter 3.2., delete PP83 against the entries for UN2813.

7. In the list of packing instructions at 4.1.4, delete PP83 underP403 and P410.

Justification

8. Editorial removal of surplus text with no effect on transport or safety.